once one would infer there is no relationship between the phenomena. However, Mr. King analyzes the lines by subdividing them into groups, and concludes "that a close correspondence does not exist, but there is a general agreement as to magnitude of the two effects when the means of a large number of lines are considered." I should like to add, that the "means of a large number of lines," leaves much to be desired in the proof of a relationship. Mr. King's method of subdivision carries with it another suggestion. When he divides the separations into small, medium and large, he reduces the number of types of separation in each class. For clearly a line whose separation is small does not belong to the same type as one whose separation is large. Again he selects the ratio of each of three subdivisions to low, medium and high displacement respectively. This gives arbitrarily nine divisions. By this method he shows there is an approach toward uniformity in relative magnitude. The suggestion is, what may we expect when these groups are broken up into real series types? Comparing the three iron lines mentioned above gives nothing of promise, although close measurement may show two of them to agree. But in the absence of an established series one can not affirm that these lines belong together. If this point has any merit, it would be worth while to compare substances among whose lines definite series have been established.

The tabulated data for the author's two substances lack just one thing, viz., the ultraviolet spectrum, to make them the most complete study which has appeared.

B. E. Moore

University of Nebraska,
August, 1912

Introduction to General Thermodynamics. By Professor Henry A. Perkins, Trinity College, Hartford. Wiley and Sons.

Recognizing the lack of suitable text-books in English on thermodynamics for students of physical chemistry, the author in writing this book has attempted to make good the deficiency.

The volume comprises some 225 pages of octavo size subdivided into eight chapters, the titles of which in order are: General Heat Relations; The First and Second Laws of Thermodynamics; Entropy; Thermodynamic Equations; Perfect Gases; Real Gases; Change of State; The Solution of Problems. At the end of the book there are eight tables giving gas constants, thermoelectric and calorimetric constants of certain substances, density and thermo-elastic coefficients of certain liquids and solids, critical and Van der Waals constants, coefficients of expansion of gases and relation of pressure units in various systems.

The methods of presentation and demonstration employed by the author are for the most part classical and it is therefore unnecessary to refer to them specifically. The emphasis laid upon the doctrine of available energy as a means of interpretation of the second law is notable. The various thermodynamic potentials and the phase rule of Gibbs receive appropriate attention. The last chapter is noteworthy on account of the large number of problems which are proposed for solution by the student. Solutions of typical problems are given.

The scope of the book appears to be quite adequate for the purposes which the author has in view. A remarkable amount of material is condensed into a small volume through the aid of mathematical expressions; and although the demands made upon the mathematical knowledge of the reader are not very great it would appear that the author probably intends the book to be used by students having the advantage of a competent instructor. Professor Perkins has, in writing this book, furnished a valuable addition to the English text-book literature of thermodynamics.

A. P. Wills

Astronomy in a Nutshell. By Garrett P. Serviss. Illustrated. G. P. Putnam's Sons. 1912. Pp. xi + 261.

There are so many excellent popular books on astronomy and its different branches, that